FIG. 1

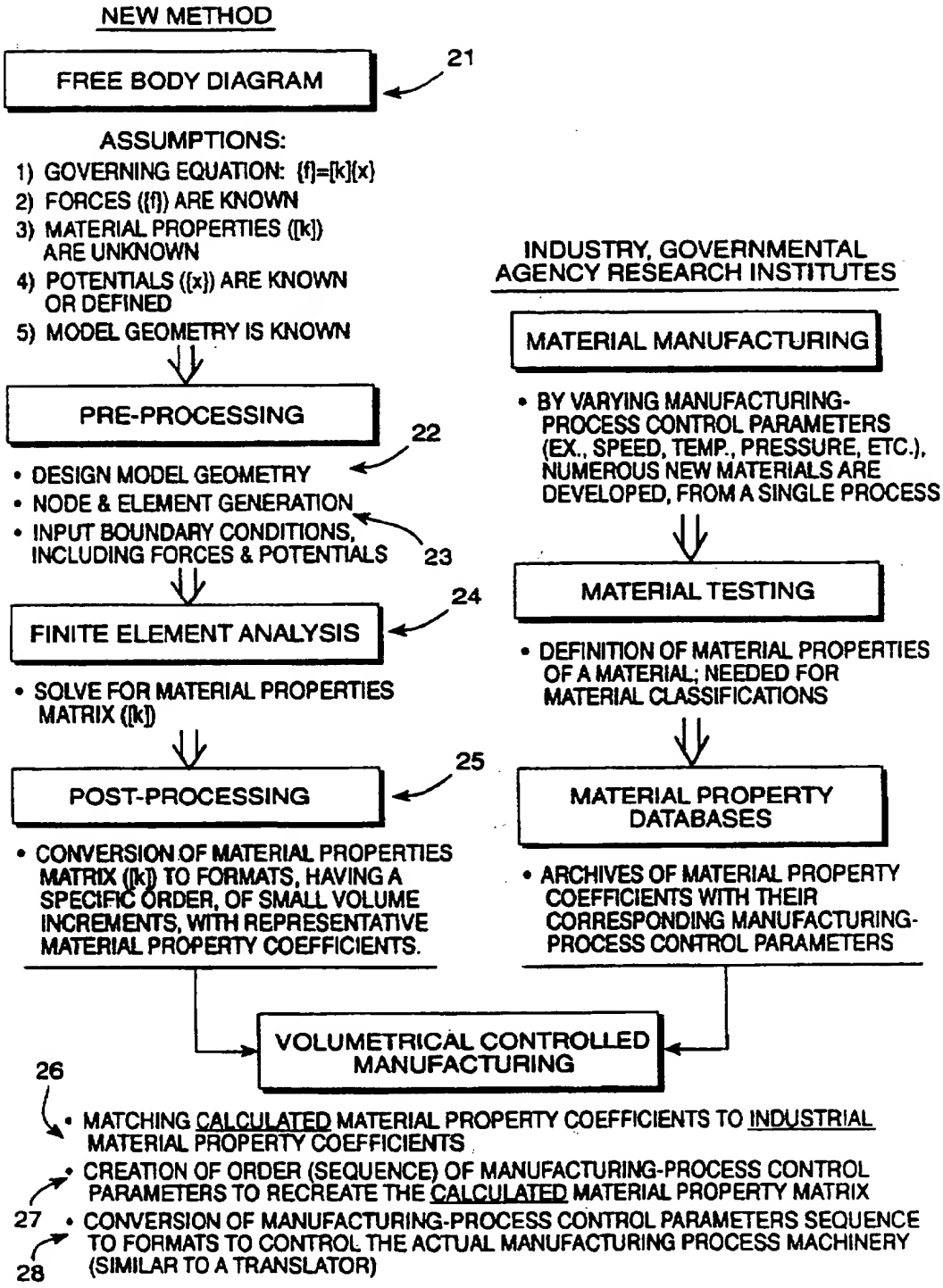

NEW METHOD
FREE BODY DIAGRAM
21
ASSUMPTIONS:
1) GOVERNING EQUATION: {f}=[k]{x}
2) FORCES ({f}) ARE KNOWN
3) MATERIAL PROPERTIES ([k]) ARE UNKNOWN
4) POTENTIALS ({x}) ARE KNOWN OR DEFINED
5) MODEL GEOMETRY IS KNOWN
PRE-PROCESSING
22
• DESIGN MODEL GEOMETRY
• NODE & ELEMENT GENERATION
• INPUT BOUNDARY CONDITIONS, INCLUDING FORCES & POTENTIALS
23
FINITE ELEMENT ANALYSIS
24
• SOLVE FOR MATERIAL PROPERTIES MATRIX ([k])
POST-PROCESSING
25
• CONVERSION OF MATERIAL PROPERTIES MATRIX ([k]) TO FORMATS, HAVING A SPECIFIC ORDER, OF SMALL VOLUME INCREMENTS, WITH REPRESENTATIVE MATERIAL PROPERTY COEFFICIENTS.
INDUSTRY, GOVERNMENTAL AGENCY RESEARCH INSTITUTES
MATERIAL MANUFACTURING
• BY VARYING MANUFACTURING-PROCESS CONTROL PARAMETERS (EX., SPEED, TEMP., PRESSURE, ETC.), NUMEROUS NEW MATERIALS ARE DEVELOPED, FROM A SINGLE PROCESS
MATERIAL TESTING
• DEFINITION OF MATERIAL PROPERTIES OF A MATERIAL; NEEDED FOR MATERIAL CLASSIFICATIONS
MATERIAL PROPERTY DATABASES
• ARCHIVES OF MATERIAL PROPERTY COEFFICIENTS WITH THEIR CORRESPONDING MANUFACTURING-PROCESS CONTROL PARAMETERS
VOLUMETRICAL CONTROLLED MANUFACTURING
26
• MATCHING CALCULATED MATERIAL PROPERTY COEFFICIENTS TO INDUSTRIAL MATERIAL PROPERTY COEFFICIENTS
• CREATION OF ORDER (SEQUENCE) OF MANUFACTURING-PROCESS CONTROL PARAMETERS TO RECREATE THE CALCULATED MATERIAL PROPERTY MATRIX
27
• CONVERSION OF MANUFACTURING-PROCESS CONTROL PARAMETERS SEQUENCE TO FORMATS TO CONTROL THE ACTUAL MANUFACTURING PROCESS MACHINERY (SIMILAR TO A TRANSLATOR)
28

FIG. 2A

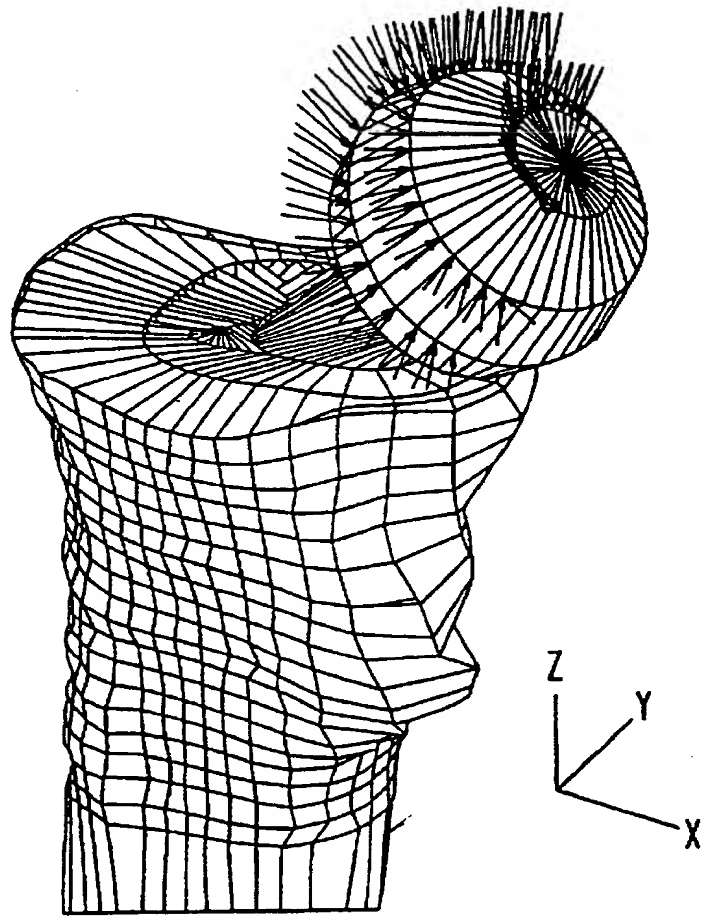
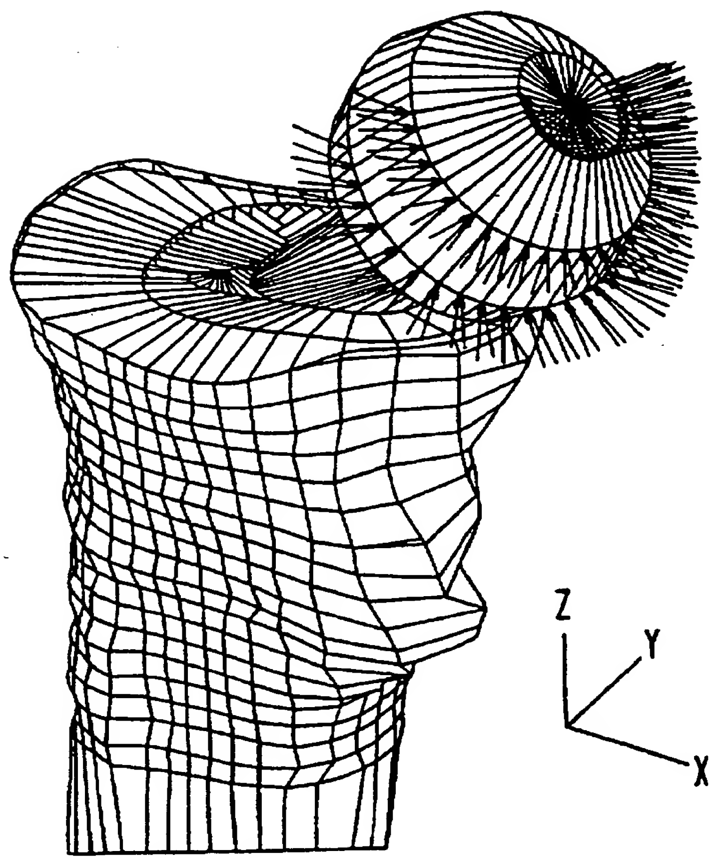


FIG. 2B



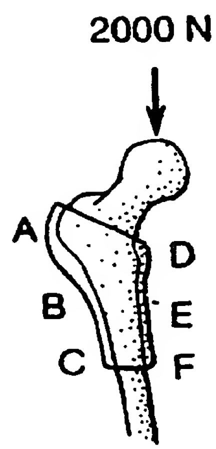
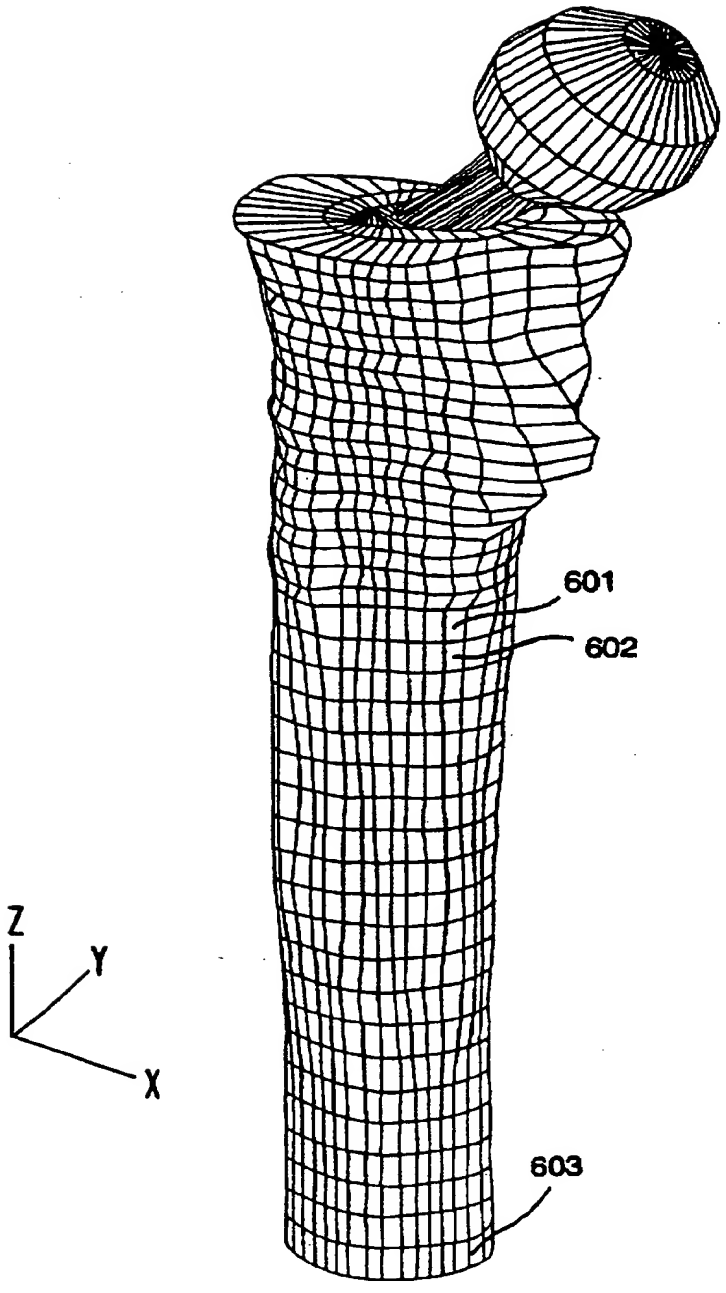


FIG. 3A

	INTACT FEMUR
A	0.221 ± 0.057
B	0.875 ± 0.119
C	0.698 ± 0.122
D	1.217 ± 0.150
E	1.315 ± 0.131
F	1.208 ± 0.131

FIG. 3B

FIG. 4



M1-1	E1-1	σ1-1	PROCESS	PROCESS PARAMETERS
M1-2	E1-2	σ1-2	PROCESS	PROCESS PARAMETERS
⋮	⋮	⋮	⋮	⋮
M1-n	E1-n	σ1-n	PROCESS	PROCESS PARAMETERS

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FIG. 5A

M2-1	σ'2-1	PROCESS	PROCESS PARAMETERS
M2-2	σ'2-2	PROCESS	PROCESS PARAMETERS
⋮	⋮	⋮	⋮
M2-n	σ'2-n	PROCESS	PROCESS PARAMETERS

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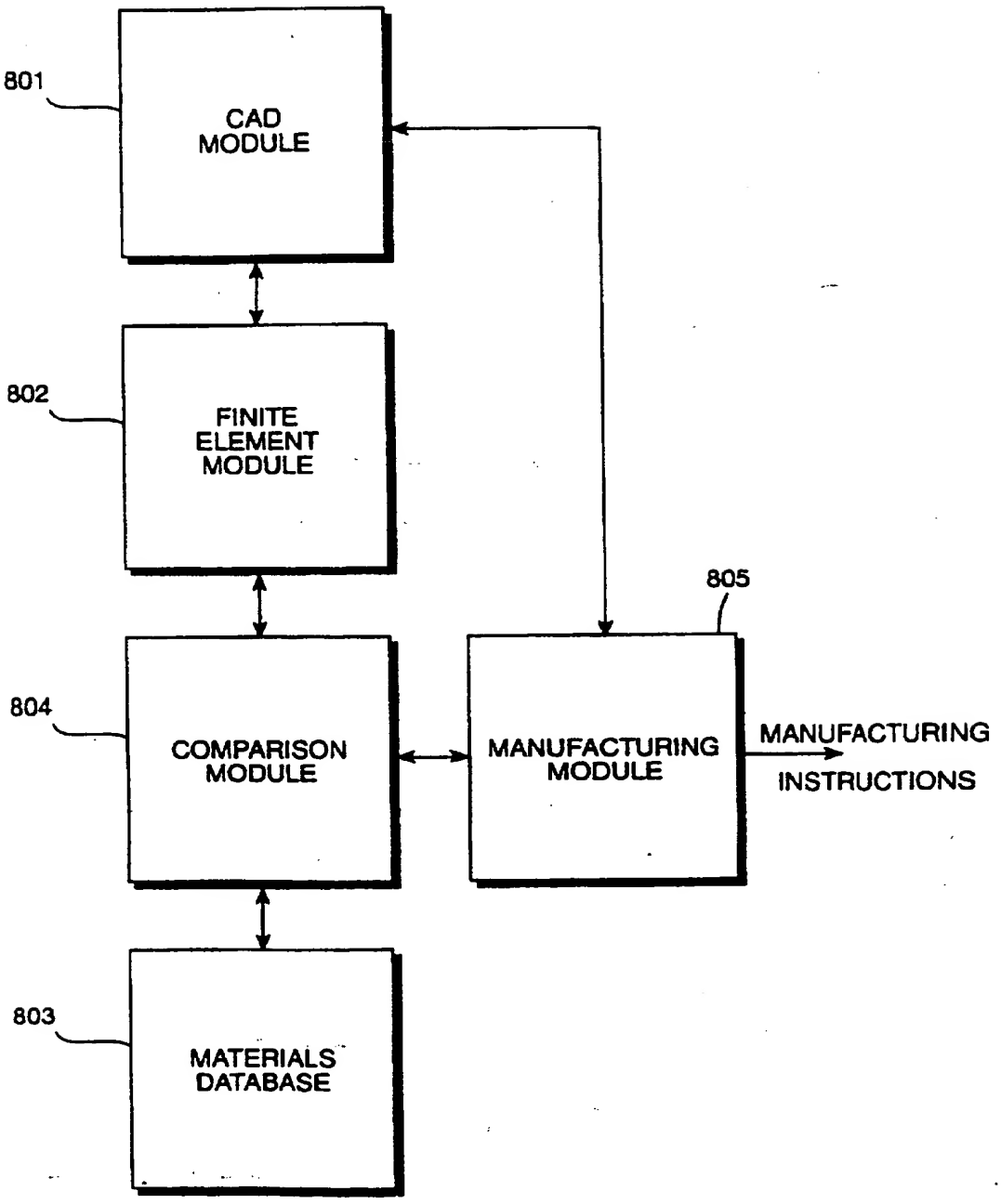
FIG. 5B

FIG. 6


801
CAD MODULE
802
FINITE ELEMENT MODULE
804
COMPARISON MODULE
803
MATERIALS DATABASE
805
MANUFACTURING MODULE
MANUFACTURING INSTRUCTIONS

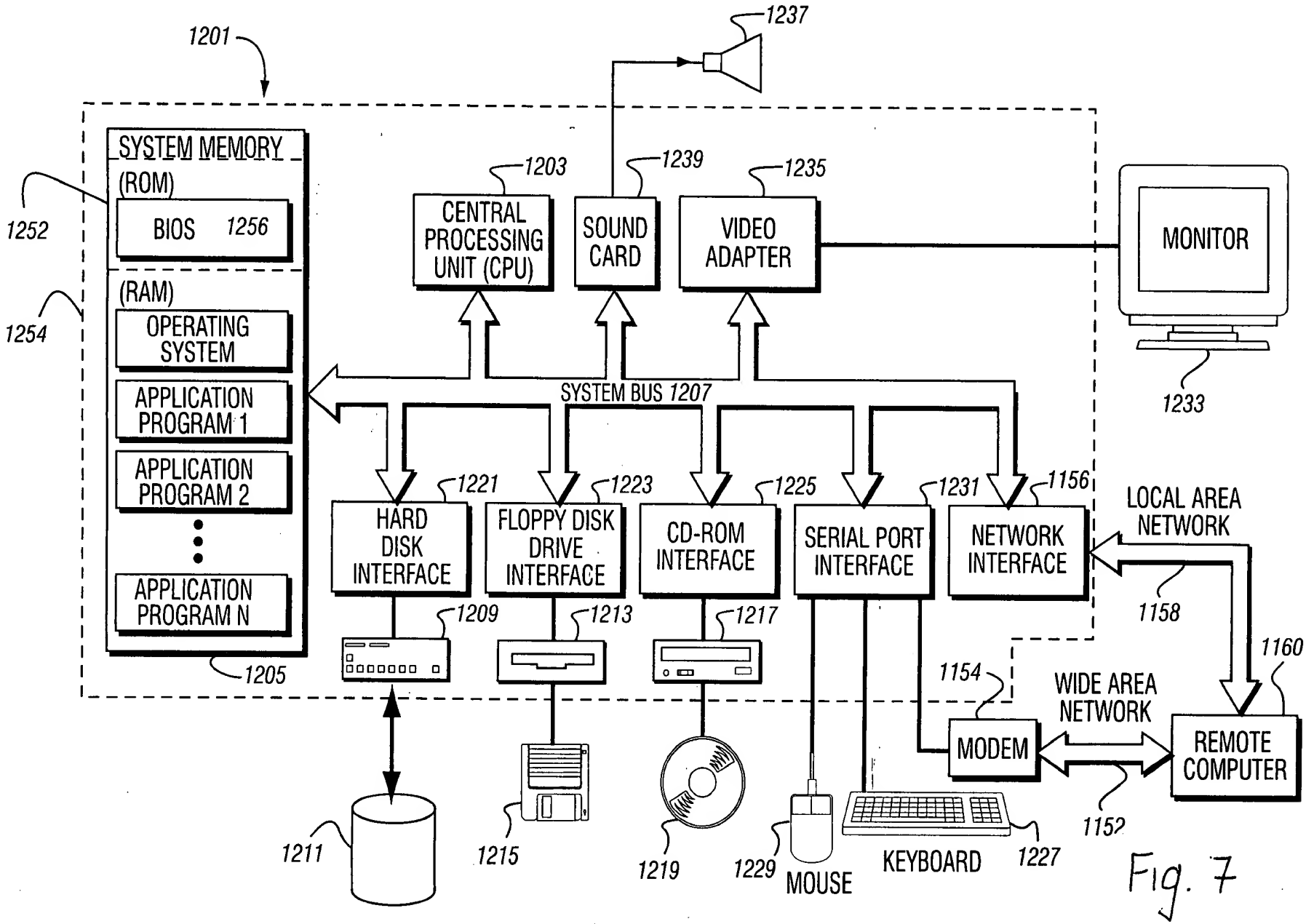


Fig. 7

FIG. 8